Claims:

1. A method for making a thin film filter having a negative temperature drift coefficient comprises the steps of:

providing a film stack material;

providing a substrate wafer which has a coefficient of thermal expansion greater than that of the film stack material;

polishing the substrate wafer;

depositing thin film layers made of the film stack material on the substrate wafer at a temperature substantially higher than room temperature, creating a film stack on the substrate wafer;

cooling the substrate wafer-film stack laminate to room temperature;

cutting the cooled substrate wafer-film stack laminate into pieces.

2. The method as described in claim 1, wherein the coefficient of thermal expansion of the substrate is within the range from $10\times10^{-6}/°K$ to $20\times10^{-6}/°K$.

3. The method as described in claim 1, wherein the substrate wafer is transparent to electromagnetic waves having a wavelength in a range between 1561 nm and 1620 nm.

4. The method as described in claim 2, wherein the substrate is made of a SiO_2-Na_2O-K_2O-Li_2O-PbO-XO_2 system, wherein X can be titanium (Ti) or zirconium (Zr).

5. The method as described in claim 2, wherein the substrate is made of a SiO_2-Na_2O-K_2O-Li_2O-PbO-Y_2O_3 system wherein Y can be aluminum (Al).

6. The method as described in claim 2, wherein the substrate is made of a

SiO_2-Na_2O-K_2O-Li_2O-P_2O_5-ZO_2 system, wherein Z can be titanium (Ti) or zirconium (Zr).

7. The method as described in claim 2, wherein the substrate wafer is doped with at least one of a group comprising lead (Pb), lithium (Li), sodium (Na) and potassium (K).

8. The method as described in claim 1, wherein the surface of the substrate has an average roughness range of between 0.1 nm and 0.8 nm.

9. The method as described in claim 1, wherein the materials making the film stack are tantalum oxide and silicate dioxide.

10. The method as described in claim 1, wherein the film stack endures a substantially compressive stress at room temperature.

11. A method for making a thin film filter having a negative temperature drift coefficient comprises the steps of:

> providing a laminate comprising a glass substrate and a film stack formed thereon;
>
> using at least one ion beam source to bombard the film stack of the laminate when the laminate is in a target position, wherein the at least one ion beam source is heated to release ions and the ions are accelerated by an electrical field;
>
> cutting the bombarded laminate into pieces.

12. The method as described in claim 11, wherein the at least one ion beam source is a Kaufman source.

13. The method as described in claim 11, wherein, before reaching the target laminate the mean energy of the accelerated ions is within the range from 100

to 1500 electron-volts.

14. The method as described in claim 11, wherein, after being bombarded, the substrate endures a substantially tensile stress at room temperature.

15. The method as described in claim 11, wherein, after being bombarded, the film stack endures a substantially compressive stress at room temperature.

16. A structure of a film filter comprising a plurality of film layers made of a film stack material and a substrate wafer which said film layers are deposited on at a temperature substantially higher than a room temperature and is retained to after being cooled to the room temperature, wherein said substrate wafer owns a coefficient of thermal expansion greater than that of the film stack material so as to generate compressive forces upon the associated film layers, thus resulting in a negative temperature drift coefficient of said film filter.

17. A structure of a film filter comprising a plurality of film layers made of a film stack material and a substrate wafer which said film layers are deposited on and retained to; wherein said substrate wafer owns a coefficient of thermal expansion greater than that of the film stack material, and from a microscopic viewpoint both said substrate wafer and said film layers commonly define a convex configuration under a condition that said substrate wafer is located closer to a center of said convex configuration than said filter layers.

18. A structure of a film filter comprising a plurality of film layers made of a film stack material and a substrate wafer which said film layers are deposited on and retained to, said substrate wafer owning a coefficient of thermal expansion greater than that of the film stack material and resulting in a negative temperature drift coefficient of the film filter in comparison with a positive temperature drift coefficient of a conventional film filter, said film filter being characterized in that:

within a range between a higher temperature and a lower temperature with therebetween a room temperature corresponding to a normal bandwidth, said film filter at said lower temperature results in thereof a narrowed bandwidth with a reduced value smaller than another reduced value of another narrowed bandwidth resulting from said conventional film filter at said higher temperature, and said film filter at said higher temperature results in thereof a broadened bandwidth with thereof an increased value smaller than another increased value of another broadened bandwidth resulting from said conventional film filter at said lower temperature.